IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

1-3. (CANCELLED)

4. (CURRENTLY AMENDED) The optical amplifier according to ~~claim 1~~claim 17, wherein the power factor depends upon both the input power and ~~a~~ the operating temperature of the EDF. ~~optical amplifying unit.~~

5. (WITHDRAWN) The optical amplifier according to claim 1, wherein:

the change factor detecting unit detects a value of a factor that depends upon the output power of the optical signal, and

the control unit uses a result of subtraction of the value of the factor from the output power to provide the control.

6. (WITHDRAWN) The optical amplifier according to claim 1, wherein:

the change factor detecting unit detects a value of a factor that depends upon a temperature of the optical amplifying unit, and

the control unit uses a result of subtraction of the value of the factor from the output power to provide the control.

7. (WITHDRAWN) The optical amplifier according to claim 1, wherein:

the change factor detecting unit detects a value of a factor that depends upon both the output power of the optical signal and a temperature of the optical amplifying unit, and

the control unit uses a result of subtraction of the value of the factor from the output power to provide the control.

8. (CURRENTLY AMENDED) The optical amplifier according to ~~claim 1~~claim 17, wherein:

the control unit controls an excitation laser diode for the EDF ~~included in the optical~~

~~amplifying unit.~~

9-12. (CANCELLED)

13. (WITHDRAWN) The control method according to claim 9, wherein:

the detecting the factor includes detecting a value of a factor that depends upon the output power of the optical signal, and

the providing the control includes using a result of subtraction of the value of the factor from the output power to provide the control.

14. (WITHDRAWN) The control method according to claim 9, wherein:

the detecting the factor includes detecting a value of a factor that depends upon a temperature of an optical amplifying unit that amplifies the optical signal, and

the providing the control includes using a result of subtraction of the value of the factor from the output power to provide the control.

15. (WITHDRAWN) The control method according to claim 9, wherein:

the detecting the factor includes detecting a value of a factor that depends upon the output power of the optical signal and a temperature of an optical amplifying unit that amplifies the optical signal, and

the providing the control includes using a result of subtraction of the value of the factor from the output power to provide the control.

16. (CANCELLED).

17. (CURRENTLY AMENDED) An optical amplifier receiving and amplifying an input optical signal and producing an output optical signal, comprising:

a power detecting unit that detects at least one of an input power of the input optical signal and an output power of the output optical signal and produces a corresponding power detection output;

a temperature detecting unit that detects an operating temperature of an erbium-doped fiber (EDF), a change in the operating temperature causing the gain of the optical amplifier to change, and produces a corresponding temperature detection output; and

a control unit that calculates a power of an amplified spontaneous emission (ASE) based

on the power and temperature detection outputs, and adds a power factor that is determined by the power of the ASE to the input power, to maintain the gain of the optical amplifier at a predetermined value.

18. (PREVIOUSLY PRESENTED) The optical amplifier according to claim 17, wherein:

the power detecting unit detects the input power and the output power, respectively, of the input and output optical signals and produces the corresponding power detection output based on both thereof.

19. (NEW) The optical amplifier according to claim 17, wherein:

the control unit controls the gain to be

$$gain = \frac{Pout}{Pin + \frac{Poutase}{Gset}(Pin, T)}$$

where Pin represents the input power, Pout represents the output power, Gset represents a set gain, Poutase represents the power of the ASE, and T represents the operating temperature of the EDF.